IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/687,285
Applicant	:	Jeffrey Donald Manuell et al.
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Examiner	:	Chun Cao
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Sir:

In response to the Office Action mailed July 20, 2007, having a period for response set to expire on October 20, 2007, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for managing an operation of a computing complex having one or more computer servers ~~during a utility outage~~, the method comprising the steps of:

reading a set of control files for determining a current load shed category for the computing complex during a utility outage;

monitoring ~~one or more~~ a plurality of operating environment parameters within the computing complex during the utility outage, wherein the computing complex is powered by at least one battery driven uninterruptible power supply during the utility outage; and

selectively powering down one or more of the computer servers based on a current state of at least two of the plurality of operating environment parameters, the current load shed category for the computing complex, and a criticality value pre-assigned to each of the one or more computer servers.

2. (Reinstated – formerly Claim #2) The method of claim 1, wherein the one or more operating environment parameters include remaining battery operating time of the at least one uninterruptible power supply powering the computing complex.

3. (Original) The method of claim 1, wherein the one or more operating environment parameters include one or more ambient temperature readings within the computing complex.

4. (Previously Amended) The method of claim 1, wherein the one or more operating environment parameters include a current time of day.

5. (Original) The method of claim 1, wherein the computing complex is powered by at least one battery driven uninterruptible power supply during the utility outage.

6. (Currently Amended) The method of claim 1, wherein the method further comprises the step of sending pager text messages to a predetermined set of support personnel based on the current state of the plurality of operating environment parameters.

7. (Original) The method of claim 1, wherein the utility outage is a power failure within the computing complex.

8. (Original) The method of claim 1, wherein the utility outage is a cooling failure within the computing complex.

9. (Currently Amended) A computer-readable program for managing an operation of a computing complex having one or more computer servers ~~during a utility outage~~, the computer-readable program stored on a tangible, recordable computer-readable medium, the computer readable program being configured to perform the steps of:

reading a set of control files for determining a current load shed category for the computing complex during a utility outage;

monitoring ~~one or more~~ a plurality of operating environment parameters within the computing complex during the utility outage, wherein the computing complex is powered by at least one battery driven uninterruptible power supply during the utility outage; and

selectively powering down one or more of the computer servers based on a combined current state of at least two of the plurality of operating environment parameters, the current load shed category for the computing complex, and a criticality value pre-assigned to each of the one or more computer servers.

10. (Reinstated – Formerly Claim 10) The computer readable program of claim 9, wherein the one or more operating environment parameters include remaining battery operating time of the at least one uninterruptible power supply powering the computing complex.

11. (Original) The computer-readable program of claim 9, wherein the one or more operating environment parameters include one or more ambient temperature readings within the computing complex.

12. (Previously Amended) The computer-readable program of claim 9, wherein the one or more operating environment parameters include a current time of day.

13. (Original) The computer-readable program of claim 9, wherein the computing complex is powered by at least one battery driven uninterruptible power supply during the utility outage.

14. (Currently Amended) The computer-readable program of claim 9, wherein the method further comprises the step of sending pager text messages to a predetermined set of support personnel based on the current state of the plurality of operating environment parameters.

15. (Original) The computer-readable program of claim 9, wherein the utility outage is a power failure within the computing complex.

16. (Original) The computer-readable program of claim 9, wherein the utility outage is a cooling failure within the computing complex.

17. (Currently Amended) An apparatus for managing an operation of a computing complex comprising one or more computer servers ~~during a utility outage~~, the apparatus comprising:

a set of environment equipment for maintaining an operating environment of the computing complex during a utility outage;

an environment monitor server coupled to the set of environment equipment for monitoring ~~the~~ a current state of ~~one or more~~ a plurality of operating environment parameters within the computing complex during the utility outage;

a set of control files for determining a current load shed category for the computing complex; and

a centralized load shedding manager coupled to the environment monitor server and the set of control files, the centralized load shedding manager managing the selective powering down of one or more of the computer servers based on ~~a~~ the current combined state of ~~the one or more~~ two or more of the plurality of environment parameters, ~~a~~ the current load shed category for the computing complex and ~~a~~ criticality value pre-assigned to each of the one or more computer servers.

18. (Original) The apparatus of claim 17, wherein the set of environment equipment includes at least one member chosen from the group consisting of: an uninterruptible power supply (UPS), a power distribution unit (PDU), a static transfer switch (STS), an air handling unit (AHU), and a temperature probe.

19. (Original) The apparatus of claim 18, wherein the one or more operating environment parameters include remaining battery operating time of the uninterruptible power supply powering the computing environment.

20. (Original) The apparatus of claim 18, wherein the one or more operating environment parameters include one more ambient temperature reading provided by the temperature probe.

21. (Previously Amended) The apparatus of claim 18, wherein the one or more operating environment parameters include a current time of day.

22. (Original) The apparatus of claim 18, wherein the computing environment is powered by the uninterruptible power supply during the utility outage.

23. (Original) The apparatus of claim 18, wherein the utility outage is a power failure within the computing complex.

24. (Original) The apparatus of claim 18, wherein the utility outage is a cooling failure within the computing complex.

25. (Original) The apparatus of claim 17, wherein the set of control files includes a load shedding master table.

26. (Original) The apparatus of claim 17, wherein the set of control files includes a load shedding pager table.

27. (Previously Amended) The apparatus of claim 17, wherein the apparatus further includes one or more pagers coupled to the centralized load shedding manager, wherein the centralized load shedding manager sends pager text messages to one or more pagers based on the current state of the operating environment parameters.

28. (Original) The apparatus of claim 17, wherein the environment monitoring server is coupled to the centralized load shedding manager by one or more simple network management protocol (SNMP) traps.

29. (Currently Amended) A method for deploying computing infrastructure, comprising integrating computer-readable code into a computing ~~system~~ complex, wherein the code in combination with the computing ~~system~~ complex is capable of providing management of an operation of the computer ~~system~~ complex ~~during a utility outage~~, the method comprising the steps of:

reading a set of control files for determining a current load shed category for the computing complex during a utility outage;

monitoring ~~one or more~~ a plurality of operating environment parameters within the computing ~~system~~ complex during the utility outage; and

selectively powering down one or more computer servers within the computing ~~system~~ complex based on a current state of at least two of the plurality of ~~the~~ operating environment parameters, the current load shed category for the computing complex, and a criticality value pre-assigned to each of the one or more computer servers.

REMARKS/ARGUMENTS

The present application discloses a method, apparatus and computer-readable program for providing management of a computing complex during a utility interruption. More specifically, the present invention provides an automated method, apparatus and computer-readable program to manage the selected power down of devices within an information technology computing complex when the loss of conventional utility service occurs. This invention selectively shuts down systems/devices within the computing complex based on the criticality of the systems/devices and the current state of at least two of a plurality of environment parameters (e.g., battery reserve level, temperature, time, etc.) monitored within the computing complex.

Reconsideration of the application, as amended, is requested. Claims 1, 6, 9, 14, 17, and 29 have been amended. Claims 2 and 10 have been reinstated. No new matter has been added. Claims 1-29 remain in this application.

In sections 4 and 5 of the Office Action, the Examiner states the specification is objected to as failing to provide the proper antecedent basis for the claimed subject matter of claim 9. Applicants have now amended claim 9 to now recite a tangible, <u>recordable</u> computer readable medium. Support for this amended claim may be found at page 12, paragraph 31 of the specification.

In section 7 of the Office Action, the Examiner rejects claims 1, 5, 7, 9, 13, 15, and 29 under 35 U.S.C. §102(e) as being anticipated by Coppola (US Patent 4,611,289). Applicants have amended claims 1, 9, and 29 to overcome this rejection and respectfully traverse this rejection as it pertains to claims 5, 7, 13, and 15.

Claims 1, 9, and 19, as amended, now contain the claim element: "selectively powering down one or more of the computer servers based on a current state of at least two of the plurality

of operating environment parameters, the current load shed category for the computing complex, and a criticality value pre-assigned to each of the one or more computer servers". Applicants respectfully submit that the Coppola reference does not provide this claim element and the rejection should be withdrawn for the reasons set forth below.

Coppola monitors a single environmental parameter (i.e., remaining battery power, col. 5, lines 46-47) within a computing complex during a power outage. In contrast to Coppola, the present invention not only monitors remaining battery power, but also ambient temperatures, time, etc. (page 8, paragraph 22), then uses at least two of the plurality of operating environment parameters to selectively power down servers within the computing complex (Fig. 5, page 13, paragraphs 34-35). By monitoring multiple operating environment factors concurrently, the system is able to more effectively manage the computing complex during a utility interruption than if just a single operating environment parameter, such as remaining battery power, is monitored.

For this reason, claims 1, 9, and 19 are now submitted as being in condition for allowance. Claims 5, 7, 13, and 15 depend either directly or indirectly from claims 1 and 9, which are now submitted as being in condition for allowance. Thus, claims 5, 7, 13, and 15 are also now submitted as being in condition for allowance.

In section 8 of the Office Action, the Examiner rejects claims 1, 3, 5, 7, 9, 11, 13, 15, and 29 under 35 U.S.C. §102(e) as being anticipated by Hansen et al. (US Patent 7,043,647). Applicants have amended claims 1, 9, and 29 to overcome this rejection and respectfully traverse this rejection as it pertains to claims 3, 5, 7, 11, 13, and 15.

Hansen et al. is directed to a system and method of allocating power in a rack mounted computer system where the individual servers are powered from a central power supply system. The structure includes a series of serial communication pathways coupling the servers and the individual power supplies in the power supply system. A series of chassis communication modules communicates with servers it its respective chassis, and relays messages to and from a

power supply communication module, which is responsible for granting or denying permission for individual servers to allocate power. The disclosed system also envisions intelligent de-allocation of power, for example, in the event of individual components of the central power supply system (Hansen et al., Abstract).

Claims 1, 9, and 19 contain the claim element of "reading a set of control files for determining a current load shed category for the computing complex **during a utility outage**". Claims 1, 9, and 19 further contain the claim element of "monitoring a plurality of operating environment parameters within the computing complex **during the utility outage**, wherein the computing complex is powered by **at least one battery driven uninterruptible power supply during the utility outage**".

Applicants respectfully submit that Hansen et al. neither discloses nor suggests the management of computer systems **during a utility outage**, as claimed by the present invention. Hansen et al. is limited to de-allocating power in the event of a failure of individual components of the central power supply system (Hansen et al., Abstract). In fact, Hansen et al. performs its de-allocation activities assuming that at least some of the components of the central power supply system are still operable. In the event of a utility outage, conventional power will be completely shut off, and none of components comprising the central power supply system would be operable, thus no staged de-allocation could be performed.

Also, Hansen et al. makes no mention that any of the components comprising the central power supply system are **battery driven, uninterruptible power supply components**, as claimed in the present invention. Rather, Hansen et al. merely mentions that the proposed rack system merely removes the individual, conventional AC to DC power supplies from the servers and places those power supplies at a central location within the rack (column 1, lines 53-60). Thus, in the event of power outage, none of the power supply components within the central power supply would be available for the staged de-allocation in column 10, lines 13-40).

For these reasons, Applicants submit that the Hansen et al reference neither discloses nor suggests the claimed subject matter of claims 1, 9 and 19 and thus, these claims should be passed to issuance. Further, claims 5, 7, 9, 11, 13, and 15 depend either directly or indirectly from claims 1 and 9, which are now submitted as being in condition for allowance. Thus, claims 5, 7, 13, and 15 are also now submitted as allowable over the cited Hansen et al. reference, and are now in condition for allowance.

In section 9 of the Office Action, the Examiner rejects claims 4, 8, 12, and 16 under 35 U.S.C. §103(a) as being unpatentable over Hansen et al. (US Patent 7,043,647) in view of Bodas (US Publication 2004/0163001 A1). Applicants respectfully traverse this rejection.

Claims 4, 8, 12, and 16 rely from independent claims 1 and 9, already discussed above, with regard to Hansen et al. More specifically, the Hansen et al. reference does not disclose nor suggest managing a computing complex during a utility outage, as claimed by the present invention. Rather, Hansen et al. is limited to de-allocating power in the event of a failure of individual components of the central power supply system (Hansen et al., Abstract).

In fact, Hansen et al. performs its de-allocation activities assuming that at least some of the components of the central power supply system are still operable. In the event of a utility outage, conventional power will be completely shut off, and none of components comprising the central power supply system would be operable, thus no staged de-allocation could be performed.

Also, Hansen et al. makes no mention that any of the components comprising the central power supply system are **battery driven, uninterruptible power supply components**, as claimed in the present invention. Rather, Hansen et al. merely mentions that the proposed rack system removes the individual, conventional AC to DC power supplies from the servers and places those power supplies at a central location within the rack (column 1, lines 53-60). Thus, in the event of power outage, as contemplated by the present invention, none of the power supply

components within the central power supply would be available for the staged de-allocation in column 10, lines 13-40.

Appellants respectfully submit that the passages cited by the Examiner from the Bodas reference (i.e., paragraphs 0032, 0035, and 0053) also make no mention of managing computer servers during a utility outage. In paragraph 32, the power and thermal manager (EPTM) rather generically refers to its function as: "may manage power allocated to the computer system 200 based on power and cooling capacity 260".

Paragraph 0035 mentions that the EPTM may receive information about UPS and utility status, but provides no detail on what it does with this information. Paragraph 0053 simply states that if an air conditioning system goes down, the temperature in the data center may rise, and that components in the computer systems may fail. Therefore, the data system administrators (not the EPTM) may need to reduce the power consumption levels of the computer systems by powering off one or more computer systems.

Thus, Bodas neither discloses nor suggests selectively powering down one or more computer servers based on one or more ambient temperature readings within the complex **during a utility outage**.

Thus, Applicants submit that claims 4, 8, 12 and 16 are now in condition for allowance.

In section 10 of the Office Action, the Examiner rejects claims 6 and 14 under 35 U.S.C. §103(a) as being unpatentable over Hansen et al. (US Patent 7,043,647) in view of Hammond (US Patent 6,865,685). Applicants respectfully traverse this rejection.

Claims 6 and 14 rely from independent claims 1 and 9, already discussed above, with regard to Hansen et al. More specifically, the Hansen et al. reference does not disclose nor suggest managing a computing complex during a utility outage, as claimed by the present

invention. Rather, Hansen et al. is limited to de-allocating power in the event of a failure of individual components of the central power supply system (Hansen et al., Abstract).

Hammond et al. provides an event notification system for a plurality of power supplies coupled to a computer network (Hammond et al., Abstract). The "events" of Hammond et al. are exclusively related to internal conditions within the UPS itself, for example: a specified age of a UPS, a power supply or a battery, a predetermined remaining runtime of a battery, a failure of a UPS, a power supply or a battery to pass a self diagnostic test, a UPS or power supply being unavailable, or a change of the power load of the power supply system being greater than a predetermined limit (Hammond, col. 2, lines 54-60). While Hammond et al. monitors and reports on internal conditions within the UPS itself, it neither discloses nor suggests managing a computing complex during a utility outage, as claimed by the present invention.

Since neither Hansen et al. or Hammond et al. provide the necessary claim element of managing a computing complex during a utility outage, Applicants respectfully submit that claims 6 and 14 are in condition for allowance and should be passed to issuance.

In section 11 of the Office Action, the Examiner rejects claims 17-25 under 35 U.S.C. §103(a) as being unpatentable over Bodas (US Publication 2004/0163001 A1) in view of Coppola (US Patent 4,611,289). Applicants respectfully traverse this rejection.

Claim 17 of the present invention includes the claim element: "a centralized load shedding manager coupled to the environment monitor server and the set of control files, the centralized load shedding manager managing the selective powering down of one or more of the computer servers based on the combined current state of two or more of the plurality of environment parameters, the current load shed category for the computing complex and a criticality value pre-assigned to each of the one or more computer servers".

Coppola looks at only one environmental parameter (i.e., remaining battery power in the UPS) when determining how to selectively powering down computers within the system.

Column 2, lines 30-34 of Coppola states, "In one embodiment of the invention, the microprocessor is also responsive to the battery bank of the backup power source to determine the remaining energy which can be supplied by the power source during a utility power interruption". In contrast to Coppola, the present invention looks at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Bodas does look at multiple environmental parameters (i.e. power management (paragraphs 49-51) and thermal management (paragraphs 52-54), however, Bodas looks at each of these factors **in isolation** when determining what action to take within the computing complex. In contrast to Bodas, the present invention monitors the "**combined** current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Since neither Coppola or Bodas provides the key claim element of looking at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex, Applicant respectfully submits that claims 17-25 are now in condition for allowance and should be passed to issuance.

In section 12 of the Office Action, the Examiner rejects claims 26 and 27 under 35 U.S.C. §103(a) as being unpatentable over Bodas (US Publication 2004/0163001 A1) in view of Coppola (US Patent 4,611,289) and Hammond et al. (US Patent 6,865,685). Applicants respectfully traverse this rejection.

Claims 26 and 27 depend directly from Claim 17, thus inherit all of the prior claim limitations of claim 17. Claim 17 of the present invention includes the claim element: "a centralized load shedding manager coupled to the environment monitor server and the set of control files, the centralized load shedding manager managing the selective powering down of one or more of the computer servers based on the combined current state of two or more of the plurality of environment parameters, the current load shed category for the computing complex and a criticality value pre-assigned to each of the one or more computer servers".

Coppola looks at only one environmental parameter (i.e., remaining battery power in the UPS) when determining how to selectively powering down computers within the system. Column 2, lines 30-34 of Coppola states, "In one embodiment of the invention, the microprocessor is also responsive to the battery bank of the backup power source to determine the remaining energy which can be supplied by the power source during a utility power interruption". In contrast to Coppola, the present invention looks at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Bodas does look at multiple environmental parameters (i.e. power management (paragraphs 49-51) and thermal management (paragraphs 52-54), however, Bodas looks at each of these factors **in isolation** when determining what action to take within the computing complex. In contrast to Bodas, the present invention monitors the "**combined** current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Hammond monitors for the occurrence of "predetermined events" within a UPS. These predetermined events can include, for example, a specified age of a UPS, a power supply or a batter, a predetermined remaining runtime of a battery, a failure of a UPS, a power supply or a battery to pass a self diagnostic test, a UPS or power supply being unavailable or a change of the power load of the power supply system being greater than a predetermined limit (column 2, lines 51-59). A comparison program compares UPS data with a predetermined event to determine if **one** of the conditions has occurred (column 3, lines 2-4). Thus, Hammond performs a one-to-one comparison between a piece of UPS data against a single predetermined event to determine if one of the conditions has occurred. In contrast, the present invention looks at the **combined** current state of two or more of the plurality of environment parameters when determining what action to take within the computing complex.

Since neither Coppola nor Bodas nor Hammond provides the key claim element of looking at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex, Applicants respectfully submit that claims 26 and 27 are now in condition for allowance and should be passed to issuance.

In section 13 of the Office Action, the Examiner rejects claim 18 under 35 U.S.C. §103(a) as being unpatentable over Bodas (US Publication 2004/0163001 A1) in view of Coppola (US Patent 4,611,289) and Ewing et al. (US Patent 5,949,974). Applicants respectfully traverse this rejection.

Claim 18 depends directly from Claim 17, thus inherits all of the prior claim limitations of claim 17. Claim 17 of the present invention includes the claim element: "a centralized load shedding manager coupled to the environment monitor server and the set of control files, the centralized load shedding manager managing the selective powering down of one or more of the computer servers based on the combined current state of two or more of the plurality of environment parameters, the current load shed category for the computing complex and a criticality value pre-assigned to each of the one or more computer servers".

Coppola looks at only one environmental parameter (i.e., remaining battery power in the UPS) when determining how to selectively powering down computers within the system. Column 2, lines 30-34 of Coppola states, "In one embodiment of the invention, the microprocessor is also responsive to the battery bank of the backup power source to determine the remaining energy which can be supplied by the power source during a utility power interruption". In contrast to Coppola, the present invention looks at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Bodas does look at multiple environmental parameters (i.e. power management (paragraphs 49-51) and thermal management (paragraphs 52-54), however, Bodas looks at each of these factors **in isolation** when determining what action to take within the computing complex. In contrast to Bodas, the present invention monitors the "**combined** current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex. This is clearly shown in Fig. 4, in the load shedding master table 50, which looks at the combined state of two environmental parameters (battery power and temperature) when determining what action to take (also see paragraph 0032 of the present invention).

Ewing provides a system and method for providing power supply status and control in network nodes at geographically distant locations (column 4, lines 15-16). Thus, Ewing looks at a single environmental parameter (power supply status). In contrast to Ewing, the present invention monitors the "**combined** current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex.

Additionally, Ewing is non-analogous art to the Coppola and Bodas references, since only Bodas and Coppola contemplates managing a computing system during a power outage. Ewing makes neither discloses nor suggests the management of a utility complex in the event of a power outage. Rather, Ewing provides a system and method of providing power supply status and control in network nodes at geographically distant locations **during normal operation** of the complex. As a result, Applicants respectfully submit that it is improper for the Examiner to combine the Ewing reference with the Coppola and Bodas references when making the 103(a) rejection.

Since neither Coppola nor Bodas nor Ewing provides the key claim element of looking at the "combined current state of two or more of the plurality of environment parameters" when determining what action to take within the computing complex, and since Ewing is non-analogous art of Coppola and Bodas, Applicants respectfully submit that claim 18 is now in condition for allowance and should be passed to issuance.

In view of the foregoing comments and amendments, the Applicants respectfully submit that all of the pending claims (i.e., claims 1-29) are in condition for allowance and that the application should be passed to issue. The Examiner is urged to call the undersigned at the below-listed telephone number if, in the Examiner's opinion, such a phone conference would expedite or aid in the prosecution of this application.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence and any enclosures are being electronically transmitted via EFS-WEB on the date indicated below.

October 25, 2007
(Date)

Debra A. Peterson

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